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NATURAL DISASTER REDUCTION: INTERRELATIONSHIPS BETWEEN TECHNOLOGICAL AND NATURAL HAZARDS

Technical session

Addendum

Urbanization and flood control methodology in Japan

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1. From the 1960s to around 1978, the year of the first oil shock, Japan experienced a high economic growth rarely seen in world history, with a remarkable development of heavy chemical and machine industries. This extraordinary economic growth forced rapid urbanization which resulted in dense concentrations of population and assets in urban areas, particularly in three major metropolitan areas. As a result, approximately 50 per cent of the population and 75 per cent of the assets are located within the latent flooding areas of rivers as of 1985. Yet, as cities develop onto the flood plain, Japan is faced with high technology facilities such as chemical plants in an area which, if inundated, would cause enormous humanitarian, economic and environmental damage.

2. The problems caused by such rapid and dense urbanization are as follows:

(a) If a levee is breached in the major metropolitan areas, such as Tokyo and Osaka which have a dense concentration of population, assets and central management functions, it would cause terrible flooding and many lives and assets would be lost, resulting in incredible social and economic confusion. A large-scale inundation would cripple the urban heart of Japan with paralysis of transport systems, outage of on-line financial and banking systems and disruption to essential services such as water supply and

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sewerage. Parks and greens in the urban area would be spoiled by the flooding. The flooding would have a serious effect on the urban environment; health and culture would suffer. Recovery from flood damage would be over the long term. Such an issue is also valid for many rapidly developing cities around the world which find the flat flood plain areas ideal for development. They could learn from the lessons of Tokyo and Osaka and help prevent, prepare for and be able to respond to emergencies when they arise;

(b) Because of rapid urbanization, basins are almost covered with surfaces such as concrete and asphalt which do not allow water infiltration. Through the resulting lost water retention and retardation functions in basins, peak flow discharge is increased and time of flood concentration decreased; inundation has frequently occurred and greatly influenced urban activities. In addition, as previously undeveloped areas along river flood plains become valuable property for rapid expansion, it is often difficult to purchase the areas for river improvement projects. As a result, small-scale inundation becomes more frequent.

3. Japan has opted to prevent large-scale flooding by the use of super-levees, that is, high standard embankments that can contain the flood water. They are designed to a high standard sufficient to retain their protective qualities even during long-term flooding above the normal water levels. At present, they are constructed in six rivers in Tokyo and Osaka.

4. This is just part of an overall strategy to tackle rapid urbanization and flooding potential. Other complementary policies are also used, for example, the promotion of river improvement, monitoring run-off, a comprehensive warning and evacuation system, as well as public information policies to ensure that citizens at risk are aware of the areas likely to be affected by any breach.

5. While such construction projects are expensive, they are an important investment against catastrophe. Lessons from the Japanese experience would be relevant to any rapidly developing city on every continent. Japan experienced rapid growth years ago and has had the time to develop effective strategies. It is important that other countries, without the economic strength of Japan, use these lessons in planning and protection to mitigate the risk of disaster.